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Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

Job No.: CTCE/BBMP/W.No.09/KRIDL/WMM/Gradation/2013-14 06.03.2014

GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Technical Manager,** KRIDL, Bangalore.

Name of Work : Improvements and Asphalting to Road from Tennis village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014

Date of Testing : 06.03.2014

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **25500**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	990	990	3.9	96.1	95-100
22.4	5585	6575	25.8	74.2	60-80
11.2	5795	12370	48.5	51.5	40-60
4.75	4090	16460	64.5	35.5	25-40
2.36	3985	20445	80.2	19.8	15-30
0.600	2280	22725	89.1	10.9	8-22
0.075	2490	25215	98.9	1.1	0-8

Note:

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ವಿದ್ಯಾರಣ್ಯಪುರ ಉಪ ವಿಭಾಗ,
ಯಲಹಂಕ ವಲಯ,
ಬೃ. ಬೆಂ. ಮ ಪಾ., ಬೆಂಗಳೂರು-9

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Job No.: CTCE/BBMP/W.No.09/KRIDL/SDBC/Bitumen/2013-14 13.03.2014

BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AASHTO T 164 & AASHTO T 30

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP,
AGENCY	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to Road from Tennis village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
SAMPLE I/D	Asphalting to Road from Tennis village to Kempegowda main road in Ward No.09
DATE OF TESTING	13.03.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	473
3. Weight of Asphalt and Mineral matter Extracted,	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	27.00
7. Bitumen content in %	5.00	5.40
8. Average	**5.20**	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Trail 1				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	38.45	8.09	8.09	91.91	90-100
4.75	262.4	55.24	63.34	36.66	35-51
2.36	57.89	12.19	75.52	24.48	24-39
1.18	43.56	9.17	84.69	15.31	15-30
0.3	28.98	6.10	90.80	9.20	9-19
0.075	27.86	5.87	96.66	3.34	3-8

SIEVE SIZE	Trail 2				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	27.1	5.42	5.42	94.58	90-100
4.75	240.9	48.18	53.60	46.40	35-51
2.36	90.56	18.11	71.71	28.29	24-39
1.18	53.74	10.75	82.46	17.54	15-30
0.3	33.25	6.65	89.11	10.89	9-19
0.075	24.85	4.97	94.08	5.92	3-8

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ಬಿ. ಬೆಂ. ಮ. ಪಾ. ಬೆಂಗಳೂರು-97.

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Job No.: CTCE/BBMP/W.No.09/KRIDL/WMM/Gradation/2013-14 07.03.2014

GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Technical Manager,** KRIDL, Bangalore.

Name of Work : Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014

Date of Testing : 07.03.2014

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **8990**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	285	285	3.2	96.8	95-100
22.4	2860	3145	35.0	65.0	60-80
11.2	1785	4930	54.8	45.2	40-60
4.75	1365	6295	70.0	30.0	25-40
2.36	780	7075	78.7	21.3	15-30
0.600	740	7815	86.9	13.1	8-22
0.075	825	8640	96.1	3.9	0-8

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GRADATION FOR WMM
MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Technical Manager,** KRIDL, Bangalore.

Name of Work : Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014

Date of Testing : 07.03.2014

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **9200**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	315	315	3.4	96.6	95-100
22.4	2940	3255	35.4	64.6	60-80
11.2	1875	5130	55.8	44.2	40-60
4.75	1360	6490	70.5	29.5	25-40
2.36	755	7245	78.8	21.3	15-30
0.600	780	8025	87.2	12.8	8-22
0.075	825	8850	96.2	3.8	0-8

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Job No.: CTCE/BBMP/W.No.09/KRIDL/WMM/AIV/2013-14

06.03.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	06.03.2014

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	384	387	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	299	301	
4	Aggregate Impact value = percent fines	22.14	22.22	
	100* (W_2/W_1)%			22.18

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/W.No.09/KRIDL/WMM/S-T/2013-14 06.03.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of Work	Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	06.03.2014

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Result : Flakiness Index = **12.47%**

Elongation Index = **13.84%**

Result : Combined Flakiness & Elongation index 26.31%

Comments:

→ Maximum allowable Flakinee & Elongation Index for Wet Mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/W.No.09/KRIDL/BC/AIV/2013-14

13.03.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Bituminous Concrete
Date of Testing	13.03.2014

Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	386	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	295	
4	Aggregate Impact value = percent fines			
	100* (W_2/W_1) percent	22.02	22.77	**22.40**

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Job No.: CTCE/BBMP/W.No.09/KRIDL/BC/Shape.T/2013-14 : 13.03.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	: **Technical Manager,** KRIDL, Bangalore.
Name of Work	: Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	: AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Bituminous Concrete
Date of Testing	: 13.03.2014

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Result : Flakiness Index = **12.85%**

Elongation Index = **13.64%**

Result : Combined Flakiness & Elongation index **26.49%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.09/KRIDL/BC/Stripping/2013-14 13.03.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
Type of Mix	Bituminous Concrete
Date of Testing	13.03.2014

Type of binder : 60/70
Percentage of binder used : 5.00% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.00 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.3	3.33	96.67
2	3.2		
3	3.5		

Comments:

→ Minimum allowable Aggregate retained coating for Bituminous Concrete is 95%

Note:

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Job No.: CTCE/BBMP/W.No.09/KRIDL/BC/Sp_Wa/2013-14

13.03.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
Type of Mix	Bituminous Concrete
Date of Testing	13.03.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	1995	1998	1996	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1239	1238	1241	
4	Weight of saturated surface dry aggregate in air	W_3 g	2022	2023	2024	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	783	785	783	
6	Weight of oven dried aggregate	W_4 g	2005	2008	2010	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.561	2.558	2.567	2.562
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.617	2.608	2.614	2.613
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.85%	0.75%	0.70%	0.76%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

Note:

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BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

As Per IS 2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
SAMPLE I/D	Roads in Ward No.09 in Vidyaranyapura Sub Division
DATE OF TESTING	13.03.2014

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	473	472
3. Weight of Asphalt and Mineral matter Extracted, g	27	28
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27	28
7. Bitumen content in %	5.40	5.60
8. Average	**5.50**	

GRADATION AFTER EXTRACTION

TABLE - 1

SIEVE SIZE	Percent Passing, %		JOBMIX
mm	Sample 1	Sample 2	Gradation
19	100.00	100.00	100
13.2	86.57	87.25	79-100
9.5	82.69	83.52	70-88
4.75	56.23	58.45	53-71
2.36	46.52	44.78	42-58
1.18	39.62	42.53	34-48
0.6	32.54	35.48	26-38
0.3	22.61	23.57	18-28
0.15	15.48	17.53	12-20
0.075	7.56	8.52	4-10

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Job No.: CTCE/BBMP/W.No.09/KRIDL/BC/Bitumen/2013-14 13.03.2014

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

As Per IS 2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to Road from Tennis Village to Kempegowda main road in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	AEE/VSD/PR/445/5/2013-14 Dated: 28.02.2014
SAMPLE I/D	Roads in Ward No.09 in Vidyaranyapura Sub Division
DATE OF TESTING	13.03.2014

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	473	472.5
3. Weight of Asphalt and Mineral matter Extracted, g	27	27.5
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27	27.5
7. Bitumen content in %	5.40	5.50
8. Average	**5.45**	

GRADATION AFTER EXTRACTION

TABLE - 1

SIEVE SIZE	Percent Passing, %		JOBMIX
mm	Sample 1	Sample 2	Gradation
19	100.00	100.00	100
13.2	85.32	88.52	79-100
9.5	83.47	84.56	70-88
4.75	55.86	55.47	53-71
2.36	47.23	46.23	42-58
1.18	38.42	43.15	34-48
0.6	33.26	36.28	26-38
0.3	21.47	24.15	18-28
0.15	16.52	17.23	12-20
0.075	7.53	8.56	4-10

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